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(54) DISPENSER WITH SEPARATE PROPELLANT FOR PRODUCTS IN FLUENT PHASE

(71) We, J. R. GEIGY S.A., a corporation organized under the laws of the Confederation of Switzerland, of Schwarzwaldallee 215, Basle, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a push-button dispenser for the dispensing in spray form of an active agent in fluid condition by means of a propellant gas accommodated under pressure in a reservoir surrounded by a container holding the active agent and carried by a mounting to which the said container is connected, the said mounting containing high pressure obturating means for controlling the passage of propellant from the reservoir, and low pressure obturating means controlling the passage of the active agent from the container, towards a venturi-type spray nozzle housed in a push button, and means for admitting air into the container for equalising any loss of pressure caused therein by the aspiration and discharge of the active agent through said spray nozzle, a tubular stem being connected to the push-button and permitting the flow of the propellant and of the active agent towards the spray nozzle, said stem being mounted for axial displacement in the said mounting and controlling the aforesaid obturating means.

The mounting and its attachments constitute a detachable sub-assembly carrying the propellant reservoir and which can be fitted on various containers. Such dispensers have enabled the range of use of appliances of the aerosol spray type to be increased considerably.

The improvements which form the subject matter of the present invention have the object of facilitating the industrial manufacture of dispensers of the type in question and of decreasing their cost price. They tend also to enable the assembly of the dispenser component on automatic machines and the filling of the dispenser by means of conventional filling machines.

In accordance with the invention, a dispenser of the kind first referred to is characterised in that the mounting comprises a central body having a central bore therethrough and opening into a recess on that side of the said body facing said reservoir said recess being of a diameter about equal to or larger than said bore, an annular shoulder protruding into said bore, said tubular stem extending through said bore and being adapted for axial displacement relative to said body, in that said mounting further comprises holding means for engaging said propellant reservoir at a peripheral zone of said central body outside said recess; and in that said high pressure obturating means comprise an annular high pressure gasket and fastening means holding said gasket in position against said shoulder in said bore or said recess.

The gasket of the high pressure obturating means may be locked against said shoulder by a fastening ring force-fitted into said bore above said high pressure gasket.

The propellant reservoir may be crimped by its neck on a collar of the body of the mounting.

The low pressure obturating means may compirse a single flexible annular low pressure gasket which is set between the body and a cover for the container and reservoir, which cover forms part of the mounting and the tubular stem connected to the push-button may carry a plug which, in the non-dispensing position, urges the lip of the said low-pressure gasket against an annular rib provided inside the cover. The tubular stem preferably comprises a shoulder situated on the side of the low pressure gasket opposite to the plug, the said shoulder

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ensuring the deflection of the gasket in the actuation position. In the case where the high pressure gasket is held by a fastening ring force-fitted into said bore, the tubular stem may be urged towards the closure position by a spring which is fitted in the bore between the plug of said stem and said fastening ring.

Preferably the tubular stem has an axial duct for the passage of the propellant and an anuular duct for the passage of the active agent, and the tubular stem is preferably a one piece structure. The inner periphery of the high pressure gasket may be seated in an annular recess provided at the end of the tubular stem remote from the push-button and said axial duct may communicate with said recess through at least one orifice which is obturated by the inner periphery of the gasket when the tubular stem is in the non-actuated position.

A terminal nipple may be carried by said tubular stem and may be pierced by at least one aperture for communication with the axial duct of said stem, the said aperture being obturated by the inner periphery of the gasket when the tubular stem is in the non-actuated position.

In any of the above arrangements the high and low pressure obturating means may be so arranged that the high pressure obturating means are opened before the low pressure obturating means by sliding the tubular stem. For example high and low pressure obturating means may be so arranged that the high pressure obturating means are opened by the sliding of the tubular stem before the low pressure obturation means and that the opening periods of the high pressure and low pressure obturating means overlap.

Alternatively the high and low pressure obturating means may be so arranged that the low pressure obturating means are opened before the high pressure obturating means by the sliding of the tubular stem. A communication aperture may be provided in the tubular stem for the passage of propellant and have a substantially larger section than that of the venturi nozzle of the push-button.

Other features of the invention will appear further from the following description.

Specific embodiments of the invention will now be described by way of non-limiting examples with reference to the accompanying drawings, in which:

Figure 1 is a view in axial section of a mounting and its attachment in the rest position.

Figure 2 is a corresponding view on a smaller scale showing the aforesaid mounting placed in position on a dispenser.

Figure 3 is a view in section of the aforesaid dispenser in the actuation position.

Figure 4 is a view in axial section of a second embodiment at rest.

Figure 5 is a similar view of the embodiment of fig. 4 during actuation.

Figure 6 is a view in axial section of another embodiment at rest.

Figure 7 is a similar view of the embodiment of fig. 6 during operation, and

Figures 8 to 10 are graphs relating to the operation.

Figure 11 is a view in elevation, in axial section, of the upper part of a dispenser in accordance with another embodiment.

Figure 12 is a section on a larger scale taken along the line XII-XII in fig. 11.

Figure 13 is a view in elevation of a part of the push button tubular stem.

Figure 14 is a diagrammatic view similar to fig. 11 showing another embodiment, and

Figures 15, 16 and 17 are diagrams showing in axial section various connections between the propellant reservoir and the mounting.

Referring to fig. 1, there can be seen the mounting of a dispenser according to the invention which comprises a cover 1, for example of plastics material, to which is attached a body 2, these two members receiving mutual support on a shoulder 3 having a socket receiving an annular flexible gasket 4 which belongs at the same time to the low pressure obturator provided for the active agent, and to the low pressure obturator provided for the inlet of the outside air. The fastening of the components 1 and 2 can be ensured for example by ultrasonic welding.

In the cover 1 there is provided a central aperture 5 and in the body 2 there is an axial recess 6 both of which are traversed with a radial clearance by a tubular stem 7 connected to an actuating push button 8 containing an atomisation nozzle 9 of the venturi type which is fitted into a cavity 11 of the head of the push button 8. The recesss 6 communicates through an aperture 12 with a widening-out section 13 provided at the bottom of the body 2.

According to one of the features of the invention, the aperture 12 is bordered by a projecting collar 14 on which there is supported an annular flexible gasket 15 belonging to the high-pressure obturator and which is crimped between this collar 14 and a sleeve 16 force fitted into the recess 6.

The stem 7, which is moulded in one piece, is provided for the passage of the propellant with an axial duct 17 limited by a conical head 18, inserted in the aperture 12. Radial apertures 19 provided in the wall of the axial duct 17 or obturated in the rest position of the stem by the flexible lip of the gasket 15 and across the central aperture of which gasket extends the head 18.

The stem 7 further comprises, around the duct 17, an annular duct 21 the wall 22 of which is separated by apertures 23 from a plug 24 arranged in the recess 6 beyond the gasket 4 relatively to the aperture 5. The edges of the apertures 23 are cut off obliquely in the form of shoulders.

The plug 24 is stressed by a spring 25 accommodated around the stem 7 and which rests at the same time on the plug 24 and on the sleeve 16. This stressing is such that the flexible lip of the gasket 4 which rests on a frusto-conical shoulder 26 of the plug 24 is curved as shown in Fig. 1 and takes counter support on an annular rib 28 of the cover 1. This ensures the tight closure of the recess 6 with regard to the aperture 5.

Opening into the recess 6 is a dip tube 29 which is force fitted in a duct 31 of the body 2 and which is intended for the passage of the active agent. (With "active agent" is meant within the instant specification and claims the product, either in liquid or in powdery form, to be dispensed).

In this position of the stem 7, an airtight closure is likewise ensured between the aperture 5 which communicates with the outside atmosphere on account of the clearance provided for the sliding of the atomiser and the space inside the cover 1 which is brought into connexion with the face of the gasket 4 turned towards the annular projection 28 by at least one radial drain 32.

In this same position of the stem 7, the lip of the gasket 15 is urged by the head 18 of the stem towards the sleeve 16 obturating the apertures 19 so that a tight closure between the aperture 12 and the axial duct 17 is ensured.

In accordance with another feature of the invention, on the side opposite the body 2, the tube of the axial duct 17 is force-fitted as far as to come in abutment in a recess 34 of the push button 8, which communicates through a duct 35 with the convergent aperture 36 of the nozzle 9.

In this position there is formed, at the end of the annular duct 21, an annular chamber 37 which communicates through a duct 38 with a second chamber 39 of the recess 11 into which open radial ducts 41 communicating with the neck of the nozzle 9, to which divergent opening 42 forms a continuation.

According to a further feature of the invention, it is provided to fasten the propellant reservoir 43 on a collar 44 of the periphery of the body 2. Tightness is ensured in the example described by a set in gasket 45. This gasket can also be cast *in situ*, or can again be left out if the body 2 is of sufficiently supple material (for example polyethylene) to allow a tight fitment on the neck of the reservoir 43.

In the case in which the propellant reservoir 43 is made of plastics material, its neck can be welded or stuck directly on to the body 2.

The sub-assembly thus fomed has the feature of being capable of assembly by axial force-fitting and with a reduced number of welding operations, which latter can be carried out by known automatic machines.

The reservoir 43 having been placed in position, it is then possible to create a vacuum inside it, the axial duct 17 of the stem 7 allowing, when the push-button is depressed, the creation of a vacuum in this reservoir and the filling of it correlatively with liquefied propellant gas 46 by means of conventional conditioning machines. The sub-assembly is then ready to be mounted on a container 47 (fig. 2) containing the active agent 48 to be dispensed.

For this purpose the cover 1 has a rim 49 which fits on to a recessed shoulder 51 of the container 47. The assembly of these two components can be effected by ultrasonic welding. The shoulder 51 and rim 49 can be so dimensioned as to permit the detachable mounting of a cap 52 covering the push button 8 when not in use.

It will be understood that in the case of thrust in the direction F on the push button 8, the stem 7 slides in the aperture 5 and in the recess 6 (fig. 3). The shoulder formed by the wall of the stem 7 above the holes 19 make the gasket 15 bend. The apertures 19 thus penetrate into the reservoir 43. The propellant in the gaseous state escapes into the duct 17, then passes through the duct 35 to the convergent opening 36 (arrows P). The release of the propellant through the nozzle 9 creates a vacuum in the chamber 39 which is transmitted through the duct 38 to the annular duct 21 and to the apertures 23 which have penetrated into the recess 6, the gasket 4 having bent under the pressure of the shoulders of the neck bordering these apertures 23, closing tightly at the same time the communication between the recess 6 and the outside. The vacuum is communicated through the recess 6 to the tube 29 which causes the suction of the active agent 48, which passes into the recess 6 then through the annular duct 21 up to the radial duct 41 (arrows L) from where it is atomized in the nozzle 9 by the flow of propellant.

At the same time the vacuum created in the container 47 by the discharge of the active agent 48 cause the inlet of outside air, which passes bteween the aperture 5 and the stem 7 and, the gasket 4 being flexed, between the latter and the annular projection 28 and then penetrates into the drain 32 and from there into the gaseous volume of the container 47 (arrows A).

The dispenser, thus arranged with a simplified structure and the high-pressure obturator of which is integrated into the body 2, has a very safe operation. Its weight is reduced and also its cost price and its assembly can be effected very quickly.

The embodiment shown in Figs. 4 and 5 is remarkable in that the high-pressure gasket 55 is here of the non-flexible tubular type and in that the stem 7 ends in a cylindrical nipple 56, at the end of which the head 18 is provided. A single aperture 57 can be provided at the inlet of the duct 17. At rest the aperture 57 is situated opposite the part of the gasket 55 which obturates it.

In this version the core or plug 24 is provided with an annular groove 58 into which the spring 25 penetrates. This allows the stroke of the stem 7 as well as the deflection of the spring 25 to be increased if necessary or to have a more compact assembly.

There is provided in the embodiment shown in Figs. 6 and 7 a thick annular gasket 60 for the high-pressure similar to the aforesaid gasket 55, but here the locking sleeve 59 of the gasket 60 is disposed towards the reservoir 43, this sleeve 59 being force-fitted in a recess 61 which communicates with the widening-out section 13. This device enables the fitting of a gasket 60 of greater diameter than that of the recess 6 which is favourable for the satisfactory firmness of the gasket.

It will be noted that in this version the duct 17 opens out into a chamber 62 of enlarged dimensions into which the convergent opening 36 of the nozzle 9 penetrates for reasons which will be explained further on.

The dispenser provided with a high-pressure gasket 15 of the bending type according to the first embodiment (figs. 1 to 3) and the dispensers with high-pressure gaskets 55 or 60 of the type with sliding stem according to the other embodiments (figs. 4 to 7) have different dynamic characteristics which constitute specific technical effects for these dispensers permitting the choice between one or other of these embodiments as a function of the technical effect sought.

More precisely, and presuming that the active agent 48 is a liquid, in the first embodiment, at the time of the opening of the obturators, the passage of the propellant begins before that of the liquid and the reverse phenomenon takes place on closure, as the curve in Fig. 8 shows, in which the rate of flow is plotted (for example in grams/second) along the D axis and the stroke of the stem 7 (for example in mm) along the H axis.

It will be observed therefore that the difference in depth to which the push button 8 is pushed by the used causes the efficiency of the system to vary; that is to say the relation between the quantity of propellant and the quantity of product evacuated.

In fact the operations take place in the following order:

1) Button depression of 0 to 0.3 mm—Nothing comes out.
2) Button depression of 0.3 to 0.6 mm—Only the propellant comes out up to its maximum rate of flow at a depression of 0.6 mm (0.120 g/s).
3) Button depression of 0.6 to 1mm—Only the propellant continues to come out (with a constant rate of flow of 120 g/s).
4) Button depression of 1 to 1.6 mm—The propellant is still coming out with its maximum rate of flow, and the product is sucked up with an increasing rate of flow according to the movement up to 1.6 mm (of 0 to 0.360 g/s).
5) Beyond 1.6 mm the total rate of flow remains constant.

When the push-button is released, the sequence is reversed. This phenomenon has the advantage of completely expelling the liquid that remains in the nozzle. When pressure is again applied on the push button the atomisation is fine from the beginning and does not contain any droplets.

The only thing reverse to this advantage is the fact that it is necessary for user to press the push button down completely, as otherwise the efficiency of the dispenser is lower than its maximum value, with the result that the propellant is exhausted more quickly than the liquid and the container 47 cannot be completely emptied.

In the second and third previous versions, the varied dynamic conditions can be obtained according to the positions of the high and low-pressure gaskets relatively to corresponding apertures of the stem 7, also taking into account the thickness of the high-pressure gaskets.

In particular it is possible to proceed so that the passage of the propellant begins after the opening of the low pressure obturator. There is then for example the following sequence (fig. 9):

1) Button depression of 0 to 1 mm—Nothing comes out.
2) Button depression of 1 to 1.6 mm—Opening of the liquid passage, however nothing comes out.
3) Button depression of 1.6 to 1.7 mm—The liquid passage stays wide open but nothing comes out.
4) Button depression of 1.7 to 2 mm—The liquid passage is open and the gas passage opens progressively in order to bring about a maximum total rate of flow of 0.480 g/s.
5) Beyond 2 mm the maximum total rate

of flow remains constant.

When the push button is released, the sequence is reversed. The atomisation stops as soon as the gas is cut off. The efficiency remains constant and the emptying of the contanier 47 containing the active agent is complete.

As in these arrangements the resistance in pressing down the push button 8 is practically constant, the risk of operating the dispenser at reduced output is practically non-existent.

This mode of operation is that which brings about the greatest economy of the propellant, on the other hand, as the liquid rises up until the last moment before the cutoff of the propellant, liquid is left in the circuit after the closure of the dispenser and this results in by the projection of droplets at the beginning of the next atomisation.

According to another mode of operation preferred by the invention for the high-pressure gaskets of the sliding type, it is provided to arrange the aperture of the passage of the propellant and liquid in such a way that the propellant starts to escape very shortly before the opening of the liquid circuit, in other words (fig. 10) that there is overlapping of the phases of opening of the circuit of the propellant G (course h_1h_2) and of the liquid circuit L (course h_3h_4).

In these circumstances, the duct containing the liquid is completely cleared by the propellant at the end of the period of use and there is no risk of droplets at the time of the following atomisation.

Of course, in order to reduce the consumption of propellant, it is advantageous to reduce as much as possible the length of the course h_1h_2.

According to another mode of operation, preferable to that last mentioned, the removal of droplets can be obtained and again reducing at the same time the consumption of propellant. To this end, it is contemplated to ensure the opening of the propellant circuit slightly after that of the liquid circuit according to the graph in fig. 9, as far as two following conditions are satisfied:

—arrangement of high-pressure gasket and in particular of the aperture 57 so that no appreciable loss in pressure is produced when the propellant passes through the duct 17 of the stem 7. This result is obtained by providing for the aperture 57 of the stem 7 a passage section considerably greater than that of the construction of the nozzle 9 (for example 2 to 8 times greater).

—providing a sufficient volume of gas between the high-presure obturator and the nozzle 9, this result being obtaned by the existence of the chamber 62 in the version in figs. 6 and 7.

More precisely this chamber should have such a capacity that the time for outlet of the gas propellant under pressure contained in the duct 17 and the chamber 62 is at least equal to the sum of the time necessary for the tubular stem to move upwardly from the position where the propellant is closed off to the position where the liquid is closed off, and the time necessary for the propellant to clean the nozzle, the latter period being very short, for example about 1/10th of a second.

Of course, with the high-pressure obturator of the sliding type, the action is always such that the aperture 57 of the stem 7 is obturated by the joint at rest, so as to prevent the passage of the liquid contained in the recess 6 inside the canal 17.

In the improvement embodiment of fig. 11, the gasket 15 of the high-pressure obturator is mounted in a recess 65 of the body 2. This recess is turned towards the propellant reservoir 43, which is for example made of a metal such as aluminium. The gasket 15 is held in the recess 65 by an annular fastening member 66 hereinafter referred to as fastening ring which consists of an independent component in the shape of a truncated cone and having a central orifice 67 in which the conical head 18 of the tubular stem 7 penetrates.

The fastening ring 66 which ensures the fixing of the gasket 15 is forcibly inserted in a cylindrical cavity 70 provided inside the body 2 and is itself crimped between an annular widening 68 provided on the periphery of this body and the neck 69 of the reservoir 43. The end portion of the reservoir 43 is bent in such a way as to fit tightly both the contour of the annular projection 68 and a swelling 71 of the same diameter as the ring 66, which is made of a material sufficiently flexible to ensure, due to the crimping of the neck 69, a tight connection between the propellant reservoir 43 and the body of the mounting. Furthermore, it is also possible to choose the ring 66, in a known way, of a material having a suitable degree of impermeability to the propellant in the reservoir 43. In this way leakages by permeation through the material of the body 2 are avoided.

It can be seen that the assembly thus described is speedy and easy and that the components such as the body 2 and the fastening ring 66 can easily be made by plastics moulding.

According to another improvement the stem 7 has, on its outer surface, a set of longitudinal ribs 72 (fig. 12). On its side, the push-button 8 which caps the stem 7, has at its base two co-axial sockets: an outer socket 73 in which is inserted by rough friction the stem 7 and an inner socket 74

which caps the tapered end 75 of the duct 17 reserved for the propellant. The extent to which the sockets 73 and 74 can go on the stem 7 is restricted by a conical face 76 provided on the stem 7 above the upper end of the ribs 72. Once the fixing-on is effected the ribs 72 delimit with the socket 73, ducts 77 (see Figure 12) reserved for the circulation of the active agent to be atomised.

It will be noted that by virtue of this construction, production by moulding of the stem 7 is remarkably facilitated.

According to another improvement, the low pressure obturator has an annular collar 78 held by the stem 7. The collar 78 has a frusto-conical outer surface 79 cooperating with the gasket 4. The surface of this collar 78, opposite the gasket 4, is straight and acts as a support for the antagonistic spring 25, while also acting as a mobile stop for the push-button assembly. In fact there are provided inside the recess 6 fixed radial stops 82. If the push-button 8 sinks in too deeply, contact with the surface 81 and stops 82 restricts its stroke.

In the embodiment shown in Fig. 14 the fastening ring provided for the gasket 15, forms one body with the neck 83 of the propellant reservoir 43, which here consists of a metal receptacle drawn on by the neck. The fitted-on base 84 of this receptacle is fixed by annular welding. This embodiment is simpler than that consisting of welding the neck on the body. To fix the body 2 of the mounting, the neck 83 is gripped by a ring 85 on an annular swelling 86 provided along the free edge of the body 2. It will be noted that in this embodiment the assembly constituted by the mounting and the reservoir comprises only three components.

Several modifications may be provided to ensure the fastening of the neck of the reservoir 43 on the body 2. Thus in the version shown in Fig. 15, the body 2 is solid, the chamber 70 being suppressed. The neck 87 of the reservoir 43 is bent back on itself in such a way as to constitute a double crimping ring 88 located in an annular groove 89 of the body 2. Adjacent to the double ring 88 is a dome 91 which penetrates a cavity 92 of the body 2 and grips, by its end, the gasket 15.

An inverted arrangement is adopted in Fig. 16, where the gasket 15 is crimped by an inner double ring 94 formed by the neck 95 of the reservoir 43. The outer surface of the double ring 94 fits the annular projection 90 of the body 2 and the fixing is completed by crimping the end portion in the groove 89 of the said body.

In the version shown in Fig. 17 the neck 95 of the reservoir 43 is made of a plastic material impermeable to the propellant, the main body and neck of this reservoir being welded together along their common socketting surface 96. The shape of the neck 95 is, further, similar to that of the fastening ring 66 in the embodiment of fig. 11. In particular it has a cylindrical shoulder 98 forced into the cavity 70 of the body 2. The stopping is effected by a rim 97 along which the components 95 and 2 are welded together, for instance by ultrasonic welding. The utilization of a reservoir of plastics material solves the problem of corrosion of the reservoir 43 either by the propellant or by the active agent contained in the outer receptacle.

Of course this invention is not restricted to the various embodiments described, and numerous modifications may be made to these within the scope of the appended claims.

Our co-pending Applications (Serial Nos. 1212375 and 1212376) 20696/70 and 20697/70 describe push-button dispensers as described above but claim different subject matter.

WHAT WE CLAIM IS:—

1. A push-button dispenser for the dispensing in spray form of an active agent in fluid condition by means of a propellant gas accommodated under pressure in a reservoir surrounded by a container holding the active agent and carried by a mounting to which the said container is connected, the said mounting containing high pressure obturating means for controlling the passage of propellant from the reservoir, low pressure obturating means controlling the passage of the active agent from the container towards a venturi-type spray nozzle housed in a push-button, and means for admitting air into the container for equalising any loss of pressure caused therein by the aspiration and discharge of the active agent through said spray nozzle, a tubular stem being connected to the push-button and permitting the flow of the propellant and of the active agent towards the spray nozzle, said stem being mounted for axial displacement in the said mounting and controlling the aforesaid obturating means, characterized in that the mounting comprises a central body having a central bore therethrough and opening into a recess on that side of said body facing said reservoir, said recess being of a diameter about equal to or larger than said bore an annular shoulder protruding into said bore, said tubular stem extending through said bore and being adapted for axial displacement relative to said body, in that said mounting further comprises holding means for engaging said propellant reservoir at a peripheral zone of said central body outside said recess; and in that said high pressure obturating means comprise an annular high pressure gasket and fastening means holding said gasket in position against said shoulder,

in said bore or said recess.

2. A dispenser according to claim 1 wherein the high and low pressure obturating means are so arranged relative to one another that the one of these means opens before the other when said tubular stem is displaced from non-dispensing to dispensing position.

3. A dispenser according to claim 1 or claim 2 wherein the gasket of the high pressure obturating means is locked against said shoulder by a fastening ring force-fitting into said bore above said high pressure gasket.

4. A dispenser according to any of claims 1 to 3 wherein the propellant reservoir is crimped by its neck on a collar of the body of the mounting.

5. A dispenser according to claim 3 wherein the low pressure obturating means comprise a single flexible annular low pressure gasket which is set between the body and a cover for the container and reservoir which cover forms part of the mounting and wherein the tubular stem connected to the push-button carries a plug, which, in the non-dispensing position, urges the lip of the said low-pressure gasket against an annular rib provided inside the cover and wherein the tubular stem is urged towards the closure position by a spring which is fitted in the bore between the plug of said stem and the aforesaid fastening ring.

6. A dispenser according to any of claims 1 to 5 wherein the high and low pressure obturating means are so arranged that the high pressure obturating means are opened before the low pressure obturating means by sliding the tubular stem.

7. A dispenser as claimed in claim 6 wherein the high and low pressure obturating means are so arranged that the high pressure obturating means are opened by the sliding of the tubular stem before the low pressure obturation means and that the opening periods of the high pressure and low pressure obturating means overlap.

8. A dispenser according to any of claims 1 to 5 wherein the high and low pressure obturating means are so arranged that the low pressure obturating means are opened before the high pressure obturating means by the sliding of the tubular stem.

9. A dispenser as claimed in claim 8 wherein a communication aperture provided in the tubular stem for the passage of propellant has a substantially larger section than that of the venturi nozzle of the push-button.

10. A dispenser as claimed in claim 8 or claim 9 and in which an axial duct for the propellant is provided in the tubular stem, wherein a chamber is provided between the duct and the venturi nozzle.

11. A dispenser as claimed in claim 10, wherein the volume of the chamber is such that the discharge time of the gaseous propellant which it contains after closure of the high pressure obturating means is at least equal to the sum of the time required for the tubular stem to pass from the propellant closure position to the active agent closure position, and the time required for the propellant to clean the nozzle as it espcapes through it.

12. A push-button dispenser as claimed in claim 1 or claim 2 wherein the high pressure gasket is fitted in said recess below said shoulder, and said fastening means comprise a fastening ring fitted into said recess to contact the underside of said high pressure gasket.

13. A dispenser as claimed in claim 12 wherein an annular portion of the high pressure gasket fastening ring extends from said recess to the outside of said mounting and is crimped between the body of the mounting and the neck of the propellant reservoir.

14. A dispenser as claimed in claim 12 wherein the high pressure gasket fastening ring is constituted by an annular, substantially frusto-conical extension of the neck of the propellant reservoir upwardly and inwardly beyond the portion of said neck which is engaged by said holding means.

15. A dispenser as claimed in claim 14 wherein the said holding means are constituted by an annular bead carried by the body of said mounting at said peripheral zone thereof, about which bead a rim portion of the neck of the propellant reservoir is crimped.

16. A dispenser as claimed in claim 14 wherein the neck of the propellant reservoir which also constitutes the fastening ring of the gasket is of moulded material and is welded on to the remainder of the reservoir which is likewise formed of moulded material.

17. A push-button dispenser as claimed in any of the preceding claims wherein the push-button tubular stem has on its outer surface a set of longitudinal ribs and the push-button which caps this stem has a socket in which is inserted the said stem and on the inner surface of which the said longitudinal ribs are supported in such a way as to form ducts for the passage of the active agent.

18. A push-button dispenser according to claim 1 and substantially as hereinbefore described with reference to, and as illustrated, in the accompanying drawings.

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7 SHEETS

COMPLETE SPECIFICATION

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SHEET 1

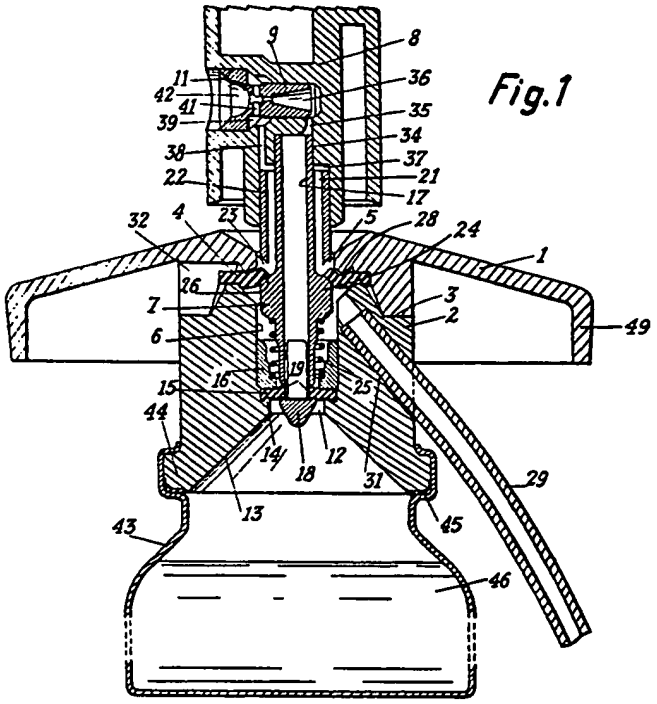


Fig.1

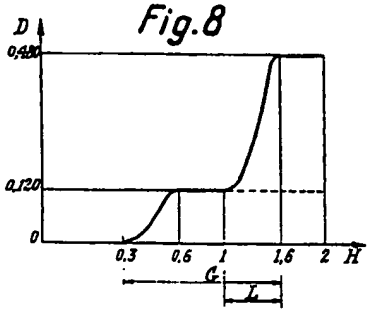


Fig.8

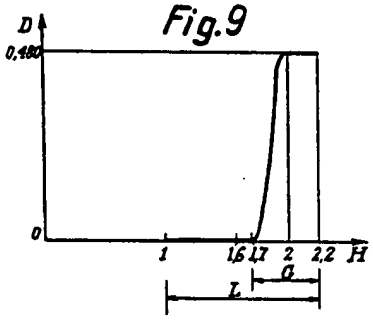


Fig.9

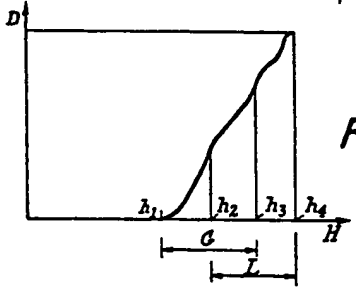


Fig.10

1,212,373
7 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 2

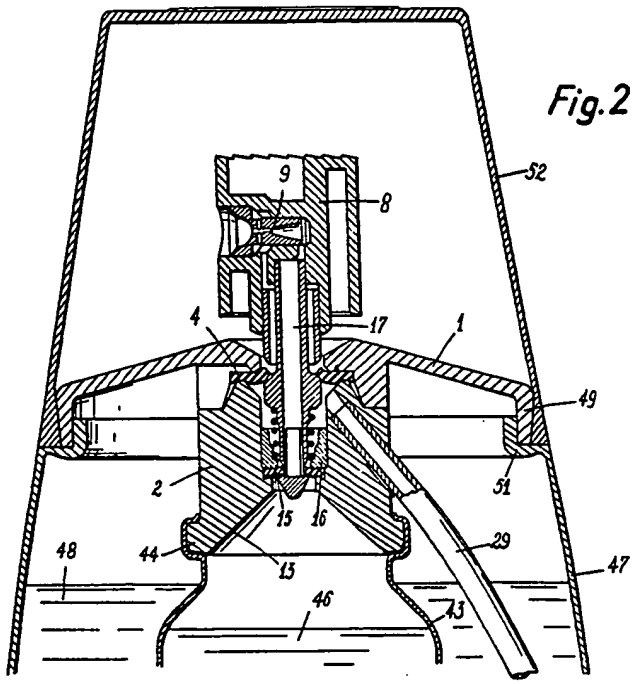


Fig.2

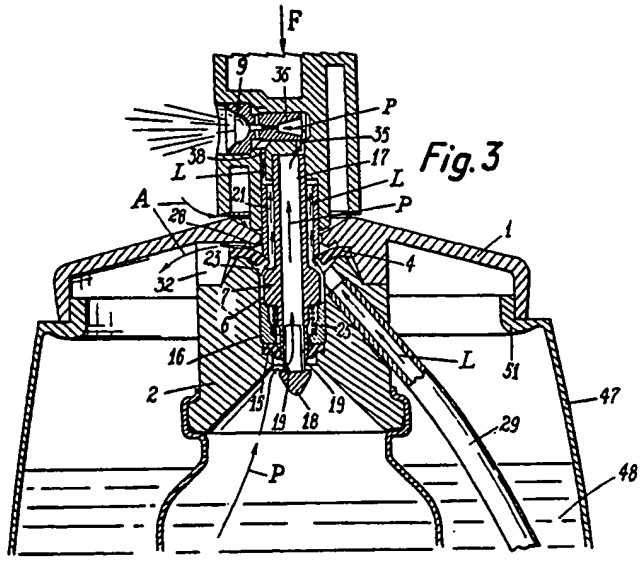


Fig.3

Fig.4

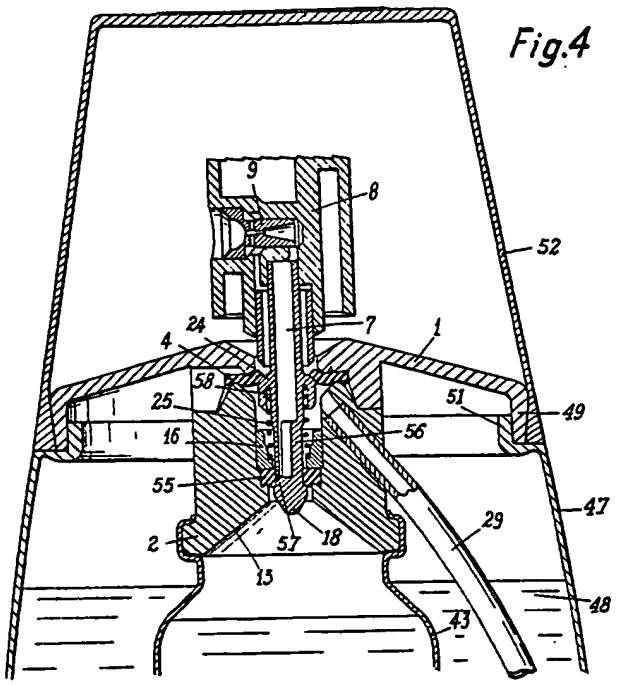


Fig.5

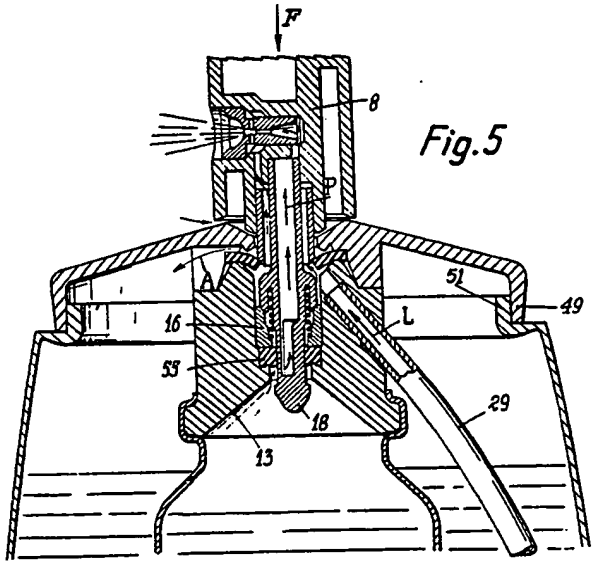


Fig.6

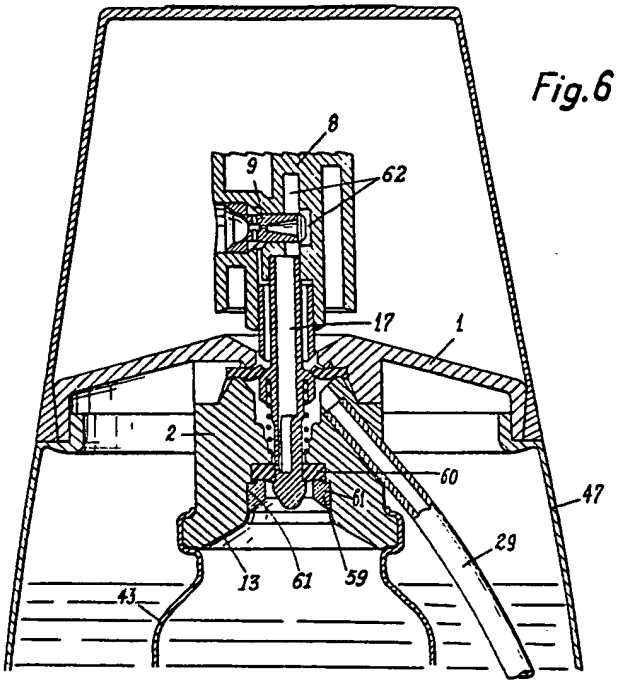
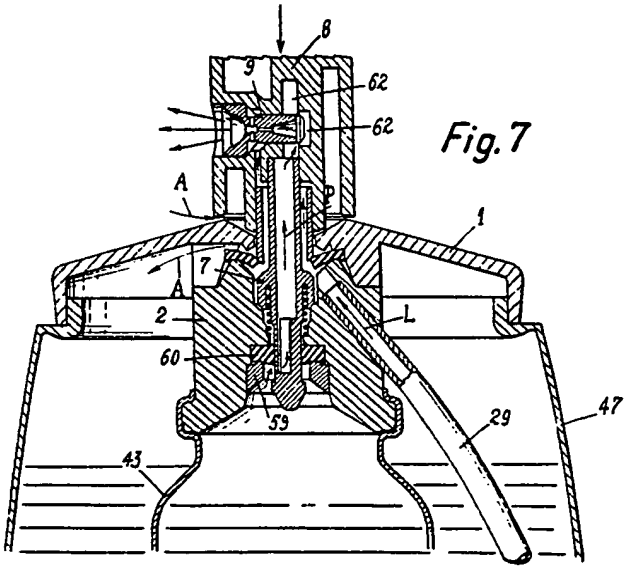


Fig.7



1,212,373
7 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 5

Fig.11

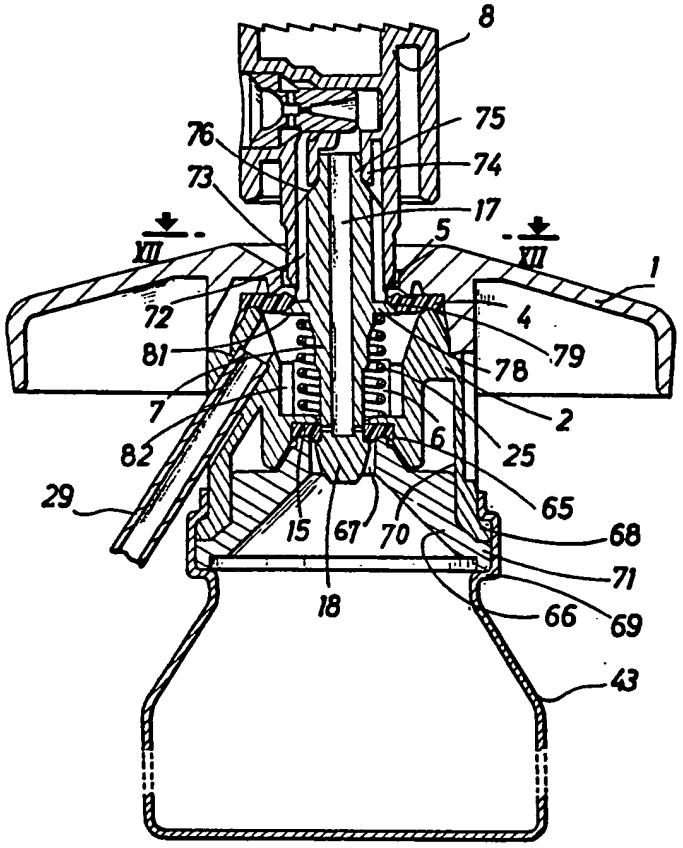


Fig.12

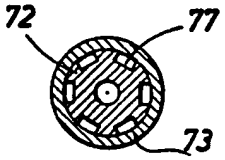


Fig.13

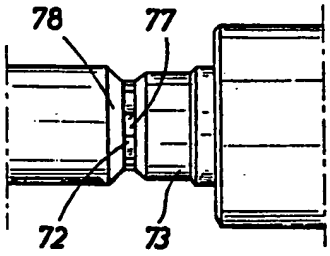


Fig.14

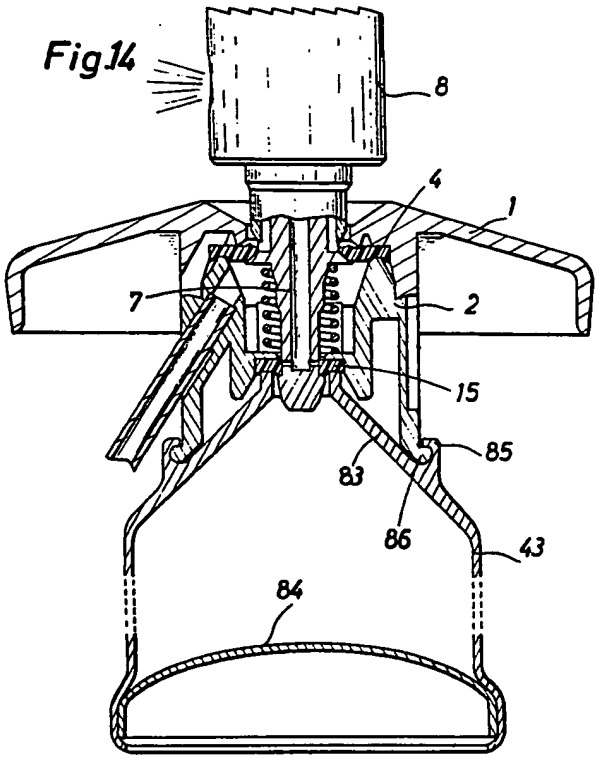


Fig.15

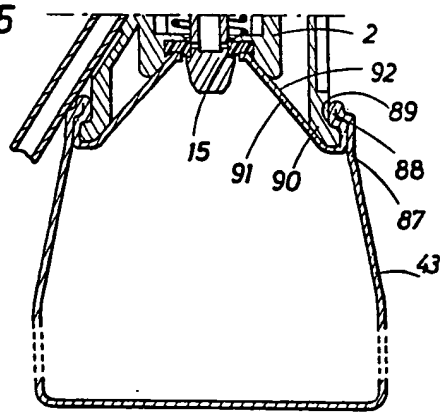


Fig.16

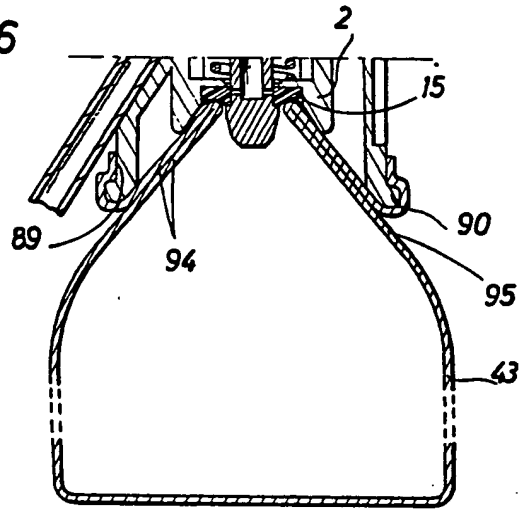


Fig.17